

## GANPAT UNIVERSITY

B. Tech. Semester: V (Civil Engineering)

Regular Examination, November – December 2014

2CI 502 Hydrology and Water Resources Engineering

Time: 3 Hours

Total Marks: 70

- Instruction:** 1 Answer to the two sections must be written in separate answer books.  
2 Figures to the right indicate full marks.  
3 Assume suitable data if required.

## Section - I

- Que. – 1 A Explain Hydrologic Cycle with schematic diagram. 6  
B Enlist types of Rain gauge. Explain Symon's Rain gauge. 6

OR

- Que. – 1 A Explain importance of Water & Water Resource Engineering 6  
B Enlist Methods to calculate Average Rainfall. Explain Thiessen's Polygon method. 6

- Que. – 2 A A catchment has five rain gauge stations. Annual rainfall recorded by rain gauge are as follows: 80mm, 55mm, 70mm, 40mm, 60mm. Take permissible error as 10%. Calculate optimum number of rain gauges in the catchment. Also find out extra number of rain gauges required for catchment. 5  
B Write short note on Colorado sunken pan and U.S. Geological survey floating pan. 6

OR

- Que. – 2 A Calculate average rainfall for the following data by using Arithmetical mean method and Thiessen's polygon method. Five Rain gauge station P, Q, R, S, T are installed at catchment area. 5

Rain gauge	P	Q	R	S	T
Rainfall in mm	38	35	33	25	30
Area of Thiessen polygon in km <sup>2</sup>	46	37	31	38	33

- B What is evapotranspiration? Explain the factors affecting evapotranspiration. 6

- Que. – 3 **Attempt any three.** 12

- A Define flood and explain causes of flood.  
B Enlist the flood control methods. Discuss non-structural methods of flood control.  
C What techniques are used for flood forecasting? Discuss any one in detail.  
D A reservoir with a surface area of 250 hectares has following metrological values during given week, Water Temperature : 20°C, Relative Humidity : 40%, Wind velocity at 1m above : 20.2 km/h, Mean barometer reading : 750mm of Hg, Estimate the average daily evaporation from the lake reservoir and the volume of water evaporated from the lake during this week. Use (a) Meyer's method (b) Rohwer's method. Take  $K_m = 0.36$ , saturation vapour pressure at 30°C = 31.80 mm of Hg.

Section - II

- Que. - 4 A Enlist methods for measurement of infiltration capacity. Explain Rain simulators method. 6
- B Derive Infiltration capacity Curve equation for infiltration. 6

OR

- Que. - 4 A Explain flooding type infiltratometers method. 6
- B The Horton's infiltration equation  $f(t)$  describe how the infiltration capacity for the soil is changing with time as the soil becomes wetter. In a specific soil, the following parameters are known:  $f_0 = 55.5$  mm/ hr,  $f_c = 3.2$  mm / hr,  $k = 2$  mm/hr. find out What is the infiltration capacity after 20 min, 30 min? How much water has infiltrated after 20 min, 30 min? 6

- Que. - 5 A Explain Factors affecting runoff in details. 5
- B The rate of rainfall for successive 30minutes periods of a 4 hour storm are given below: 3.5, 6.5, 8.5, 7.8, 6.4, 4.0, 4.0, 6.0 cm/hr. Taking a value of  $\phi$ - index is 4.5 cm/hr. calculate total rainfall, total rainfall excess, W- Index. 6

OR

- Que. - 5 A Enlist methods of Computation of Runoff. Explain infiltration method. 5
- B Well diameter is 25 cm which completely penetrates an unconfined aquifer of saturated depth of 50 m. Considering steady State is reached and  $Q=1650$  lpm . Drawdown observed in two wells 30m and 90m from the pumping well were found to be 4.0 m and 3.0 m respectively 6
- [a] Determine the Transmissivity of the aquifer
- [b] What is the drawdown at pumping well?

- Que. - 6 Attempt any three. 12
- A Define Aquifer, Aquitard, Confined Aquifer and Unconfined Aquifer
- B Write a short note on permeability & transmissibility & their relations with ground water hydrology.
- C Define Unit hydrograph and state its application and limitations.
- D Draw the typical 'Hydrograph' and explain its components with their characteristics.

Page No. 2/2

END OF PAPER